



# A Bayesian Hierarchical Meta-Analysis of Community Health Centre System Reliability in Tanzania

*Methodological Evaluation and Governance Implications*

**Mariam Juma<sup>1</sup>**

<sup>1</sup> Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam

Correspondence: [mjuma@outlook.com](mailto:mjuma@outlook.com)

**Published:** 02 May 2011 **Received:** 13 December 2010

**Accepted:** 10 March 2011 **DOI:**  
[10.5281/zenodo.18951838](https://doi.org/10.5281/zenodo.18951838)

## Author notes

*Mariam Juma is affiliated with Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam and focuses on Medicine research in Africa.*

## ABSTRACT

**Background:** Community health centres are a cornerstone of primary healthcare delivery in Tanzania, yet systematic evaluations of their operational reliability are scarce. Existing reviews often rely on conventional meta-analytic techniques that inadequately handle heterogeneous, multi-level data from diverse study designs.

**Purpose and objectives:** This study aimed to methodologically evaluate the reliability of community health centre systems using a Bayesian hierarchical framework, and to derive governance-relevant inferences from the synthesised evidence.

**Keywords:** *Bayesian hierarchical modelling, meta-analysis, health systems reliability, primary healthcare, Sub-Saharan Africa, Tanzania, methodological evaluation*

### Article Highlights

- Pooled system reliability estimate of 0.68 indicates a substantial performance gap.
- Significant heterogeneity ( $\tau = 0.41$ ) found across studies, driven by infrastructure and supply chain factors.
- Bayesian framework offers probabilistic quantification superior to conventional meta-analytic techniques.
- Findings underscore the need for governance interventions targeting infrastructure and supply chain reforms.

### Methodological Contribution

Demonstrates the application of a Bayesian hierarchical model to synthesise heterogeneous, multi-level data on health system performance, offering governance-relevant probabilistic inferences.

*This analysis provides a methodological framework for evaluating complex health systems using probabilistic evidence synthesis.*

## **ABSTRACT-ONLY PUBLICATION**

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

## **REQUEST FULL PAPER**

 **Email:** [info@parj.africa](mailto:info@parj.africa)

Request your copy of the full paper today!

## **SUBMIT YOUR RESEARCH**

**Are you a researcher in Africa? We  
welcome your submissions!**

Join our community of African scholars and share  
your groundbreaking work.

 **Submit at:** [app.parj.africa](http://app.parj.africa)



Scan to visit [app.parj.africa](http://app.parj.africa)

### **Open Access Scholarship from PARJ**

Empowering African Research | Advancing Global  
Knowledge